


TeleEngineering — Providing Soldier Reachback Capability to USACE/ERDC Experts

Rhonda Taylor



Can this bridge carry my armor vehicles? What's the best option to protect my Soldiers from mortar attacks on our base camp? How can I control this +%@&*#\$ dust!? These are the types of serious questions that are being asked in Iraq, Afghanistan and Kuwait. Field commanders want and need the answers in situations that, at times, are life and death or impact operational capabilities and critical decision making.

SGT Bryan S. Galloway, Marine Wing Support Squadron (MWSS) 472, Heavy Equipment, Engineer Co., unloads sand with a TRAM 664E Loader into a Hesco Barrier that will protect vulnerable places from indirect mortar attacks in Al Asad, Iraq. ERDC is conducting aggressive research programs to develop new materials and techniques for base-camp protection, standoff perimeter structures and blast-resistant materials. (U.S. Marine Corps photo by LCPL William L. Dubose III.)

For many of these engineering questions, the world's best experts are sitting at desks scattered around the United States. Thanks to the secure communications links offered by TeleEngineering, stateside subject matter experts (SMEs) are seeing and hearing directly from deployed Soldiers about the field problems they encounter. Once you can see and talk about a problem, it's easier to understand it and, more importantly, it's easier to propose a rapid, workable field solution using input from SMEs.

Reach Out — Reach Back

The TeleEngineering concept and system was developed by the U.S. Army Engineer Research and Development Center (ERDC) in Vicksburg, MS. ERDC, the consolidated research organization for the U.S. Army Corps of Engineers (USACE), designs and builds the TeleEngineering communications packages, and also operates the TeleEngineering Operations Center that manages overall system operations.

TeleEngineering encompasses several major aspects. The basic hardware sounds simple: a satellite-based communications system that allows deployed personnel to send and receive data and to conduct secure or nonsecure video teleconferences. Numerous communication avenues that meet users' requirements, such as telephones, facsimile machines, computer networks (e-mail) and videoconferencing systems, can be used to support global operations.

The latest system combines a suitcase-sized satellite terminal with a laptop computer, camcorder and secure videoconferencing unit that is compact, mobile and capable of sending and receiving computer files, voice communications, video or still photo images and two-way interactive video-

A TeleEngineering kit being used in western Iraq to "reach back" to experts in the United States for assistance with road analysis.



conferencing. This third-generation system consists of three suitcase-sized containers. The next iteration, to be fielded in 2005, will consist of two cases and will be 40 percent smaller.

The communications system evolution highlights the aim for compact, robust, easy-to-use and easy-to-troubleshoot equipment that has taken several years to develop and optimize using input from users, in-house electronics and design team members and the latest commercial-off-the-shelf technologies.

ERDC also fields and services all of its TeleEngineering communications packages. There are currently 70 fixed systems for use at major installations and more than 100 deployable packages for field use.

Another key TeleEngineering component is the use of SMEs. These include engineers and scientists from ERDC and other USACE organizations, research organizations, DOD and other government agencies, consultants and private industry, academia and other sources. If there is a problem, the appropriate SME will be contacted.

TeleEngineering and Operations Enduring and Iraqi Freedom (OEF/OIF)

TeleEngineering capabilities were used in the initial planning stages for OEF/OIF, during major military operations and during security operations and infrastructure rebuilding efforts.

There are now almost 100 TeleEngineering kits deployed in Iraq and Afghanistan. So far, more than 1,900 separate requests for assistance from Iraq have been received and addressed via TeleEngineering. Afghanistan requests number more than 1,700.

Some issues encountered before and during military operations that used TeleEngineering capabilities included the following:

- *Dam Breach and Military Hydrology Analysis.* USACE military hydrology SMEs looked at 120 hydraulic structures, 40 dams and 20 river crossings in Iraq to see how water could impact maneuverability and military operations.
- *Bridge Analyses (Military Load Class, damage assessments, repair guidance).*



A Soldier with the 54th Engineer Battalion examines structural damage to a bridge spanning the Euphrates River. USACE engineers stateside provided a TeleEngineering bridge assessment to determine what repairs needed to be made to the support columns and how much load the damaged bridge could safely bear. (U.S. Army photo courtesy of USACE/GRD.)

Bridges in numerous locations were analyzed to determine the types of military traffic they could sustain, assess damage (coalition and enemy action) and repair or upgrade to sustain traffic.

- *Structural and Bomb Damage Assessments.* Various structures were analyzed to determine the effectiveness of coalition or enemy attacks and to evaluate the structural strength and integrity of buildings.
- *Force Protection (facilities, base camps, new technologies, new computer analysis software).* New technologies, including passive rocket, artillery and mortar protection designs for base camps, are being rapidly disseminated to forces via TeleEngineering.
- *Mobility and trafficability (on-/off-road, road networks, Automated Route Reconnaissance Kits).* Analyses are being conducted concerning cross-country movements, aided military operations and planning, supply throughput and road reconstruction.
- *Geological information.* This includes everything from dust control, to road and pavement subgrade information, to localized building materiel issues.

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- *Rainfall/climate information.* This includes area-specific weather information, impacts and climate extremes, especially in mountainous regions.

TeleEngineering in Action

One example of TeleEngineering support includes a call from a Soldier with the 54th Engineer Battalion stating that a bridge on the Euphrates River was damaged and the combat engineers needed help. The engineers' efforts to provide data requested by the TeleEngineering-linked experts were delayed for 15 minutes while they dealt with Iraqi snipers. Once the bridge data and photos were transmitted, the SMEs provided the solution in 2 hours. It was not some "gee-whiz" solution, but one that combat engineers could readily complete using their organic field assets.

Another TeleEngineering support request came when our Soldiers took Baghdad International Airport. Engineers in the TeleEngineering Operations Center got the call at 10:30 p.m. local time, asking for assistance in getting basic services operational at the airport. Communication links were

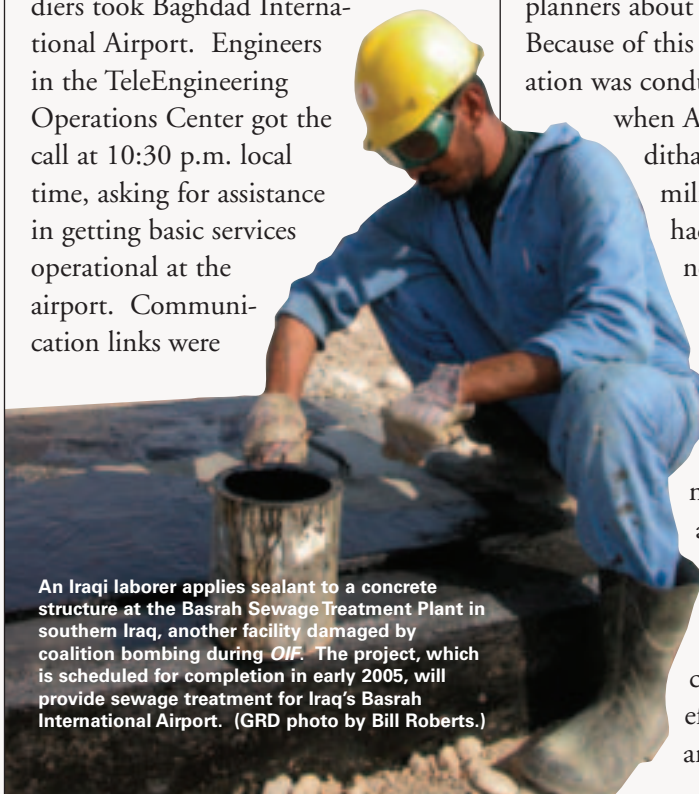
established with the unit at the Baghdad Airport, the headquarters unit in the rear, the lead infrastructure assessment team at the Corps' Mobile District, the 249th Prime Power Engineer Battalion, the TransAtlantic Programs Center and ERDC. Within 45 minutes, pictures and blueprints were streaming in from Iraq, and discussions were initiated that quickly provided answers that U.S. forces on the ground needed.

Water as a Weapon

TeleEngineering hooked up hydraulic engineers in Vicksburg with Soldiers in Iraq to address military hydrology issues. An important analysis involved the Haditha Dam on the Euphrates River. Hydraulics experts in Vicksburg predicted major flooding and disruption of American forces' capabilities in moving on Baghdad if Haditha Dam was intentionally destroyed or the dam's gates were opened for maximum flow.

In late March 2003, as American units were rolling toward Baghdad, ERDC engineers briefed senior U.S. military planners about the Haditha threat. Because of this briefing, a special operation was conducted April 1, 2003, when Army Rangers took Haditha Dam. A potential military operational threat had been averted, but a new problem arose.

Because Soldiers don't know anything about hydroelectric dam operations, TeleEngineering again provided a link to the experts. Under their direction, Soldiers were able to undo damage caused by Iraqi sabotage efforts. They repaired and started the dam's



An Iraqi laborer applies sealant to a concrete structure at the Basrah Sewage Treatment Plant in southern Iraq, another facility damaged by coalition bombing during OIF. The project, which is scheduled for completion in early 2005, will provide sewage treatment for Iraq's Basrah International Airport. (GRD photo by Bill Roberts.)

Iraqi laborers, under USACE/GRD supervision, prepare materiel to be used to reinforce concrete blocks for reconstruction efforts. TeleEngineering assets were used extensively to evaluate the structural strength and integrity of buildings and other facilities throughout Iraq and Afghanistan following *OIF* and *OEF*. (U.S. Army photo courtesy of GRD.)



dewatering pumps just hours before the dam would have been threatened with collapse. Additional Soldier repairs — also under TeleEngineering-provided guidance — stabilized the hydroelectric turbines, which significantly helped the dam's repairs later. Haditha is now a major contributor to the Iraqi national power grid.

Force Protection Concerns

One of the Army's biggest current concerns is protective measures for base camps and bed-down areas. These areas include "soft" targets such as tents, trailers and other expedient structures. Many of these are located in and around urban areas, limiting the ability to control an adequate stand-off area beyond their perimeter. These vulnerabilities and increased density of personnel make the areas lucrative targets for insurgent attacks with fragmenting rocket and mortar munitions.

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ERDC, a DOD science and technology leader in force protection and survivability, is conducting an aggressive research program to develop new materials and techniques for base-camp protection. These include expedient protective designs, new lightweight, blast-resistant materials and pre-detonation screens based on weapon fuzing and assessments of roof structure response to blast loads. For overhead protection, a combination of techniques for effective pre-detonation of incoming rounds, coupled with fragment shielding layer(s), is one of the latest and most promising technologies. These emerging technologies are being transitioned as quickly as possible to our deployed Soldiers. The most expedient vehicle for applying these new technologies to deployed forces is through TeleEngineering.

Other TeleEngineering Aspects

TeleEngineering has also become the de facto video teleconference apparatus for *OEF/OIF*. There have been more than 2,000 video teleconferences facilitated by TeleEngineering, including testimony by deployed commanders to the House Armed Services Committee. Other users include the Office of the Secretary of Defense, Secretary of the Army, Army Chief of Staff, numerous flag officers, congressmen and personnel conducting daily and weekly conferences involving Iraq or Afghanistan command elements.

Outside military requirements, family morale calls were set up using TeleEngineering for deployed units as an added benefit, which significantly aided Army family morale. (A TeleEngineering marriage was even facilitated between a Soldier in Afghanistan and his fiancée back home, and a USACE employee was sworn in as a lawyer in the Iowa state bar from Baghdad via TeleEngineering.)

From facilitating daily video teleconferences that allow military leaders to communicate with each other from worldwide locations, to providing the latest protective technologies and subject matter expertise to keep our Soldiers safe in the field, TeleEngineering continues to provide support and solutions — from thousands of miles away — for our deployed forces.

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US Army Corps of Engineers